



United States
Department of
Agriculture

Agricultural
Research
Service

National Soil
Dynamics Lab

Conservation
Systems
Research

Research
Project
Report
No. 4a

October 2002

Contact us:

USDA-ARS-NSDL
411 S. Donahue Dr.
Auburn, AL 36832
334-844-4741 x179

<http://msa.ars.usda.gov/al/auburn/nsdl/csr>



Conservation Systems Research

RESEARCH PROJECT DESCRIPTION No. 4a

Tillage Requirements for Winter-Annual Grazing Rotations (Cotton and Peanuts)



Cotton and peanut following winter grazing

Researchers


D.W. Reeves (Research Agronomist), R.L. Raper (Agricultural Engineer), G. Siri Prieto (Visiting Scientist, University of the Republic of Uruguay and Graduate Student, Auburn University), B.E. Gamble (AAES, Wiregrass Research and Extension Center), and M.D. Pegues (AAES, Gulf Coast Research and Extension Center).

The Challenge

Two-thirds of farms in the USDA *Southern Region* include livestock operations, with beef the most common. A profitable option for Alabama farmers is to double-crop cotton or peanuts with winter-grazing of beef cattle. Recent research in Alabama found that contract grazing of stocker cattle for 100 to 140 days returned \$70 to \$225 per acre. However, grazing results in soil compaction which can severely limit crop yields. In fact, cattle typically produce greater compaction force than tractors.

Our objective is to develop practical conservation tillage systems for integrating crop rotations with winter-annual grazing of stocker cattle, that improve or maintain soil quality and increase profitability:

- How do tillage systems affect soil properties after winter grazing?
- How much compaction is caused by grazing cattle?
- What are the best tillage systems for cotton and peanuts following winter grazing.



“... conservation tillage systems ... can be used to profitably integrate winter grazing with late-planted summer row crops while increasing plant residues to protect the soil.”

The Experiment

At two Alabama Agriculture Experiment Stations in the Coastal Plain, we began a three-year study in November, 2000. We are studying two summer crops (cotton and peanuts), three surface tillage methods (disk, chisel, and no-till), three sub-surface tillage methods (in-row subsoiling, paratill, and no-till), and two winter cover/grazing crops (oats and rye). All treatment combinations are grazed during the winter.

We are measuring:

- **Soil:** Bulk density, water infiltration, plant nutrients;
- **Pasture:** Dry matter production;
- **Cattle:** Performance (weight gain)
- **Plants:** Yield, leaf temperature;
- **Economics:** Production costs, returns.

What We Have Learned

We are in the middle of a three-year study, so we can only report preliminary results.

For the winter cover crops, there were no differences in dry matter production between oat and ryegrass. There were also no differences in beef cattle performance between the two crops.

There was, however, a difference in residue between the two crops. Ryegrass had more soil cover, meaning that it provided better protection of the soil – preventing soil erosion and soil water losses.

Ryegrass pastures had greater soil compaction than oat pastures. This resulted in poorer stands of cotton and peanuts following ryegrass in no-tilled fields with no subsoiling.

Cotton and peanut yields were affected by tillage. No-tillage with no subsoiling produced the lowest yields, while no-till with paratilling or in-row subsoiling resulted in yields similar to conventional tillage.



Winter grazing rotation with cotton and peanuts

Our preliminary results suggest that conservation tillage systems that alleviate soil compaction with subsoiling can be used to profitably integrate winter grazing with late-planted summer row crops while increasing plant residues to protect the soil.

Related Publications

Tillage Requirements for Winter-Annual Grazing Rotations (Vegetables). Research Project Description No. 4b.

F. Garcia Prechac, O. Ernst, G. Siri, and J.A. Terra. 2002. Integrating No-Till into Livestock Pastures and Crops Rotation in Uruguay. pp 74-80. In E. van Santen (ed.) Proceedings of the 25th Annual Conservation Tillage Conference for Sustainable Agriculture. Auburn, AL 24-26 June, 2002. Alabama Agric. Expt. Sta. Spec. Report No. 1.